## CLAIMS

What is claimed is:

1. A transverse flow adjustable pressure regulator for controlling the flow of a gas from a high pressure source to a low pressure device, the gas being delivered from the regulator at a predetermined outlet pressure, comprising:

a body defining an inlet port and a pressure chamber in flow communication with the inlet port;

a bonnet engageable with the body to define a piston chamber and at least one transverse outlet port contiguous with the piston chamber;

an end cap disposed at an end of the bonnet opposite the body;

a regulating assembly disposed in the pressure chamber, the regulating assembly including a seat and a support for the seat to support the seat in a stationary manner in the pressure chamber, the regulating assembly further including a thrust element, a retaining element and a seal disposed in part between the thrust element and the retaining element, the seal having an inner periphery;

a piston assembly having a power tube terminating at an open tubular regulating end, a piston portion having a pressure face and a piston stem, the open tubular regulating end defining a passage contiguous with a cross-bore formed in the piston stem, wherein the piston is movable in the piston chamber with the power tube traversing through the retaining element, with the seal being in engagement with the power tube to form a gas tight seal between the power tube and the retaining element, the piston assembly reciprocating between a closed state in which the open tubular regulating end is in engagement with the sealing element to isolate flow through the regulator and an open state in which the open tubular regulating end is out of engagement with the sealing element to establish flow though the regulator; and

a biasing element operably connected to the piston assembly, the biasing element exerting a force on the piston assembly to urge the piston assembly to the open state, and wherein gas pressure exerting a force on the piston pressure face urges the piston assembly to the closed state, and wherein the force exerted by biasing element on the

piston assembly is adjustable to vary the force of the gas pressure required to move the piston assembly from the open state to the closed state.

2. The pressure regulator in accordance with claim 1 wherein the seal is a bifurcated seal.

3. The pressure regulator in accordance with claim 2 wherein the bifurcated seal defines an open end and wherein the open end is oriented toward the thrust element.

4. The pressure regulator in accordance with claim 1 wherein the biasing element force is adjustable by rotation of the piston relative to the end cap.

5. The pressure regulator in accordance with claim 4 wherein the end cap remains rotational stationary and reciprocates with opening and closing of the regulator

6. The pressure regulator in accordance with claim 4 including a bearing disposed between the end cap and the bonnet.

7. The pressure regulator in accordance with claim 1 including an isolation valve disposed in the body.

8. The pressure regulator in accordance with claim 7 wherein the isolation valve is disposed between the inlet port and the pressure chamber.

9. The pressure regulator in accordance with claim 1 wherein a juncture of the outlet port and the piston chamber defines a plenum region.

10. The pressure regulator in accordance with claim 1 including a pair of opposingly disposed outlet ports contiguous with the piston chamber.

11. The pressure regulator in accordance with claim 1 wherein the biasing element is formed from a plurality of elements.

12. The pressure regulator in accordance with claim 11 wherein each of the elements is a spring washer.

13. A transverse flow adjustable pressure regulator for controlling the flow of a gas from a high pressure source to a low pressure device, the gas being delivered from the regulator at a predetermined outlet pressure, comprising:

a body defining an inlet port and a pressure chamber in flow communication with the inlet port;

a bonnet engageable with the body to define a piston chamber and a pair of opposingly disposed outlet ports contiguous with the piston chamber, a juncture of the outlet ports and the piston chamber defining a plenum region;

an end cap disposed at an end of the bonnet opposite the body;

a regulating assembly disposed in the pressure chamber, the regulating assembly including a seat and a support for the seat to support the seat in a stationary manner in the pressure chamber, the regulating assembly further including a thrust element, a retaining element and a seal disposed in part between the thrust element and the retaining element, the seal being a bifurcated seal defining an open end oriented toward the thrust element, the sealing having an inner periphery;

a piston assembly having a power tube terminating at an open tubular regulating end, a piston portion having a pressure face and a piston stem, the open tubular regulating end defining a passage contiguous with a cross-bore formed in the piston stem, wherein the piston is movable in the piston chamber with the power tube traversing through the retaining element, with the seal being in engagement with the power tube to form a gas tight seal between the power tube and the retaining element, the piston assembly reciprocating between a closed state in which the open tubular regulating end is in engagement with the sealing element to isolate flow through the regulator and an open state in which the open tubular regulating end is out of engagement with the sealing element to establish flow though the regulator; and

a biasing element operably connected to the piston assembly, the biasing element exerting a force on the piston assembly to urge the piston assembly to the open state, and wherein gas pressure exerting a force on the piston pressure face urges the piston assembly to the closed state, and wherein the force exerted by biasing element on the piston assembly is adjustable to vary the force of the gas pressure required to move the piston assembly from the open state to the closed state, the biasing element force being adjustable by rotation of the piston relative to the end cap, and

wherein during adjustment, the end cap remains rotationally stationary, and wherein the end cap reciprocates with opening and closing of the regulator.

14. The pressure regulator in accordance with claim 13 including an isolation valve disposed in the body.

15. The pressure regulator in accordance with claim 14 wherein the isolation valve is disposed between the inlet port and the pressure chamber.

16. The pressure regulator in accordance with claim 13 wherein the biasing element is formed from a plurality of elements.

17. The pressure regulator in accordance with claim 16 wherein each of the elements is a spring washer.